DUST ENTRAINMENT

formerly

(Development of a General Attenuation Law of Normal Shock Waves Propagating in Dusty Gases)

by

G. Ben-Dor and S. Sorek

Progress Report

R&D 6180-AN-01

Contract DAJA45-90-C-0033

Period

August 1, 1991 - March 31, 1992

General Background

The original research title under this contract number was "General Attenuation Law of Normal Shock Waves Propagating in Dusty Gases."

This research was originally planned to last three years beginning on August 1, 1990 and ending on July 31, 1993.

However, due to budget restrictions, the contractor committed himself only to the 1st year and clearly stated that the 2nd and the 3rd years will be financed provided:

a) appropriate budget will be available

b) interest in the subject will continue

As it turned out the contractor rightfully decided to terminate the financial support of this resarch. In turn, he initiated a new investigation, entitled, "Dust Entrainment" under the same contract number. The principle investigators of the new project were changed to Prof. Gabi Ben-Dor and Dr. Shaul Sorek.

The statement of the work which was agreed by the above mentioned principle investigators and the contractors representatives during their meetings in the USA in April 1991 is attached to this report.

Work Completed since August 1, 1991[1]

1) A detailed survey which started on October 1, 1991 is still under way. It is expected to be completed within a couple of months.

Work to be Completed by September 30, 1992[2]

1) Complete the literature survey
2) Write a report on the lierature survey
3) Formulate the conservation equations of mass, linear momentum and energy of the investigated phenomenon.

Statement of Work

for

Program "Dust Entrainment"

1 Scope
Develop the theoretical basis for particle entrainment phenomena by shock induced flows.

1.1 Background
Prof. Gabi Ben-Dor is the Chairman of the Department of Mechanical Engineering of the Ben-Gurion University of the Negev. He joined that department in 1979 after completing a Ph.D under the supervision of Prof. I. I. Glass from the Institute of Aerospace Studies of the University of Toronto. Prof. Ben-Dor's major areas of interest in the past ten years have been:
shock wave reflection phenomena
shock wave propagation in dusty media.
Prof. Ben-Dor has published so far 32 papers related to shock wave reflection phenomena and 21 papers related to shock wave propagation into dusty media (all in scientific journals).
Dr. Shaul Sorek is the Head of the Desert Hydraulogy Unit in the Desert Research Institute of the Ben-Gurion University of the Negev. He is an expert in flow and transport problems through porous/fractured media of multiphase, multicomponent together with chemical reactions and heat exchange. In that regard he is involved in the development of numerical methods, sensitivity analysis and inverse methods. He is an expert in porous medium mechanics with emphasis on wave propagation.

1.2 Objectives
To develop the fundamental constitative relations to describe the interaction process occurring in the fluidized-bed region formed by shock interaction with loose dust beds.

2 Applicable Documents will be mailed separately.

3 Requirements (Tasks)

3.1 Task 1
Literature Survey
Duration: Until Sept. 30, 1991

3.2 Task 2
Theoretical formulation
- conservation law
- constitutive relations
- boundary conditions
Duration: Oct. 1, 1991 - Sept. 30, 1992

4 Milestones
Finish Literature Survey - Sept. 30, 1991.

5 Deliverables
Progress Letters - June, July and August, 1991
Final Report - October, 1991